ANL's Dan Santini at the pump.

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DOE Pulse

Science and Technology Highlights from the DOE National Laboratories

Number 94 **November 19, 2001**

Research Highlights . . .

A new way to make "neuts"

Ka-Ngo Leung and his colleagues in the Accelerator and Fusion Research Division at DOE's Berkeley Lab have devised powerful neutron generators small enough to lower into boreholes, use in brain-cancer therapy, peer inside airport luggage—or perch on a laboratory bench. The new designs are coaxial cylinders with ion sources that emit beams radially along their length, striking targets wrapped around them. The result: many trillions of neutrons per second. Less shielding allows the compact generators to be placed close to the experiment, where they deliver as many useful thermal neutrons as the largest sources now in use, at a fraction of the cost.

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Salmonella detected with Livermore technique

Salmonella may soon be identified within hours, rather than as long as a couple weeks, thanks to a rapid-detection technique developed at DOE's Lawrence Livermore National Laboratory. A paper by biomedical scientists Peter Agron and Gary Andersen about their DNA-based detection system appeared in the Nov. 1 edition of *Applied & Environmental Microbiology.* While people who eat raw eggs in Caesar salads or egg nog are at increased risk for contracting salmonella food poisoning, that risk may become much less in the near future because of this technology. Livermore's diagnostic DNA signatures (or tests) have been in a field test for about six months.

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Super-hard steel coating

DOE's Idaho National Engineering and Environmental Laboratory researchers create a Super Hard Steel coating by transforming steel alloy into a non-crystalline metallic glass. Metallic glass has essentially no flaws, making it both hard and tough-perfect for use as a coating. Once sprayed on, the coating cannot be removed, even with a hammer and chisel. The coating exhibits extreme hardness, corrosion, and abrasion resistance properties-far surpassing other high-performance coatings such as hard chrome plating or tungsten carbide coatings. Lead researcher Daniel Branagan feels that significant cost savings will result over the lifetime of coated parts because machine parts will last much longer, and require less maintenance.

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Unraveling anthrax

Researchers at DOE's Los Alamos National Laboratory have developed the Amplified Fragment Length Polymorphism analysis tool to analyze *Bacillus anthracis* samples taken from naturally occurring anthrax outbreaks around the world. In AFLP, DNA is extracted from the bacteria and "cut" into a set of small fragments using enzymes that recognize specific stretches of DNA in the genome. From these small DNA fragments a subset is then amplified by Polymerase Chain Reaction. The resulting PCR product is then analyzed and compiled into a "fingerprint" that can be read and compared to other AFLP fingerprints in Los Alamos' extensive *B. anthracis* database.

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